



Appendix I:

Analysis of Inter-Jurisdictional Interference With Broadband and Narrowband Operations in 700 MHz Public Safety Narrowband Spectrum

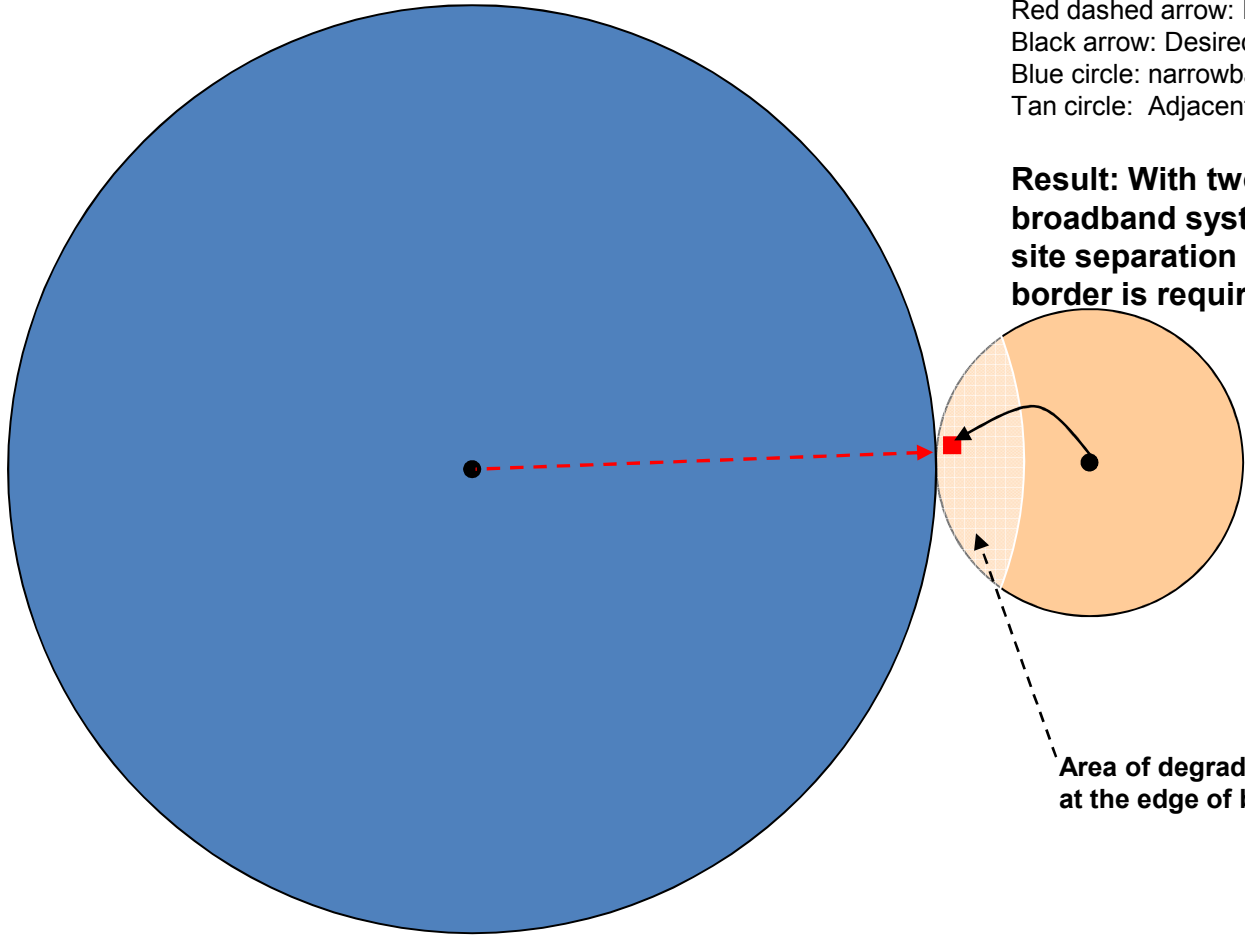
December 3, 2010

PS Docket No. 06-229

Impact on Broadband Signal From Outbound Narrowband Signal

Red square: Broadband mobile cell site.
 Black dot: Narrowband mobile site.
 Red dashed arrow: Interference path.
 Black arrow: Desired path.
 Blue circle: narrowband signal coverage area.
 Tan circle: Adjacent broadband signal coverage area.

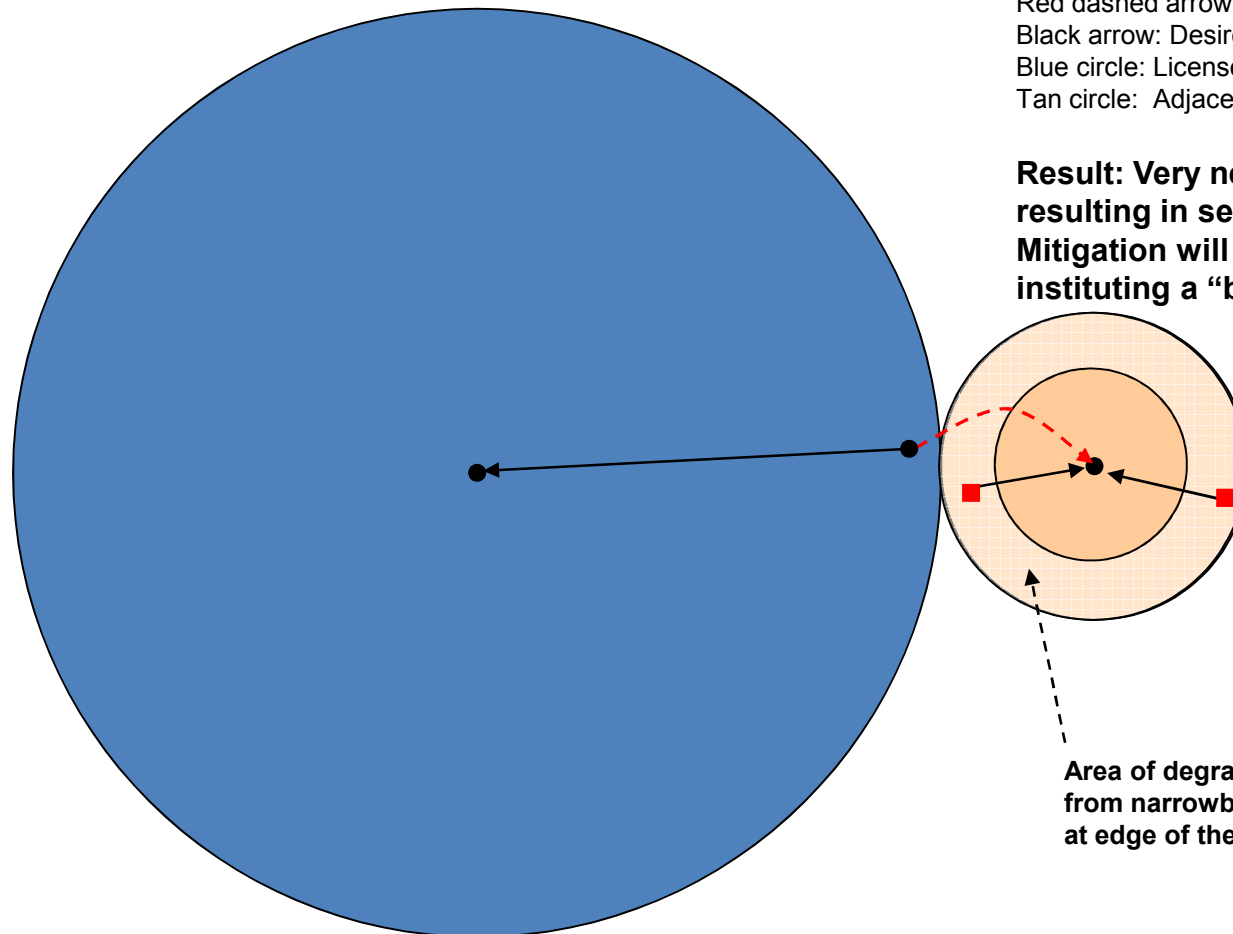
Result: With two or more narrowband channels, the broadband system experiences interference. Additional site separation and/or a “buffer” along the jurisdictions border is required.



Area of degraded broadband performance at the edge of broadband coverage.

Lognormal Shadowing (dB)	6	-6	Chosen to approximate a goal of minimum of 95% coverage.	Noise Figure (dB)	9
				Interference over thermal (dB)	3
RxP (dBm)	-97.0	-105.0		SNR for 768 kbps (dB)	-3.7
C/I (dB)	-8.0		Need to see about -3.7 dB C/I or better	Sensitivity (dBm)	-99.2

Impact on Broadband Signal From Inbound Narrowband Signal



Red square: Broadband mobile cell site.
 Black dot: Narrowband mobile site.
 Red dashed arrow: Interference path.
 Black arrow: Desired path.
 Blue circle: License area using narrowband.
 Tan circle: Adjacent license area using broadband.

Result: Very negative Signal to Noise Ratio (SNR), resulting in severe broadband service interference. Mitigation will require separating the sites and/or instituting a “buffer” along the border.

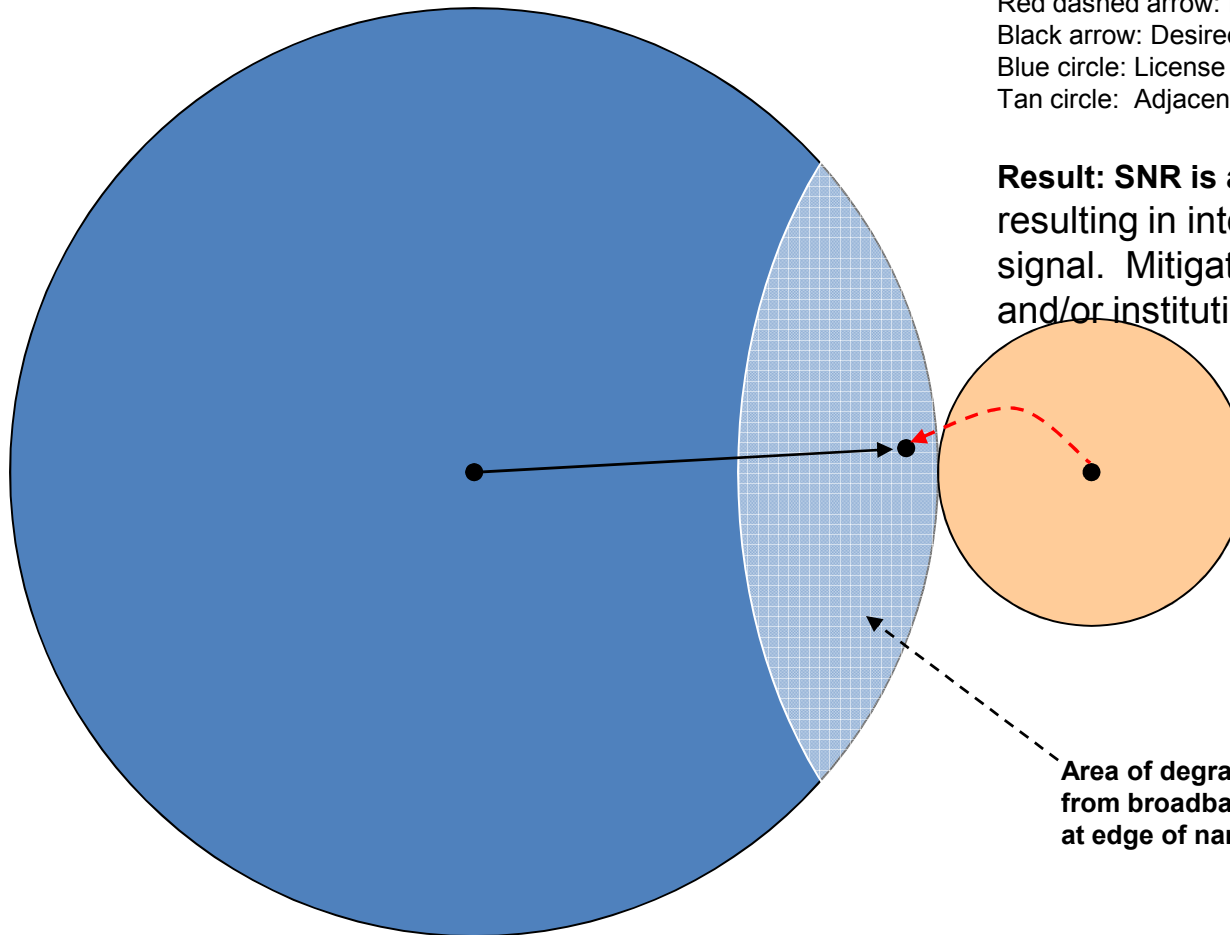
Area of degraded broadband performance from narrowband subscriber interference at edge of the entire broadband cell.

Factor	NB	BB	Explanation
TxP (W)	30	0.2	
Bandwidth Ratio	1	1	All the NB power is intercepted by the BB Rcvr
Lognormal Shadowing (dB)	6	-6	Chosen to approximate a goal of minimum of 95% coverage.
RxP (W)	120.0	0.1	

Impact on Narrowband Signal From Outbound Broadband Signal

Red square: Broadband mobile cell site.
 Black dot: Narrowband mobile site.
 Red dashed arrow: Interference path.
 Black arrow: Desired path.
 Blue circle: License area using narrowband.
 Tan circle: Adjacent license area using broadband.

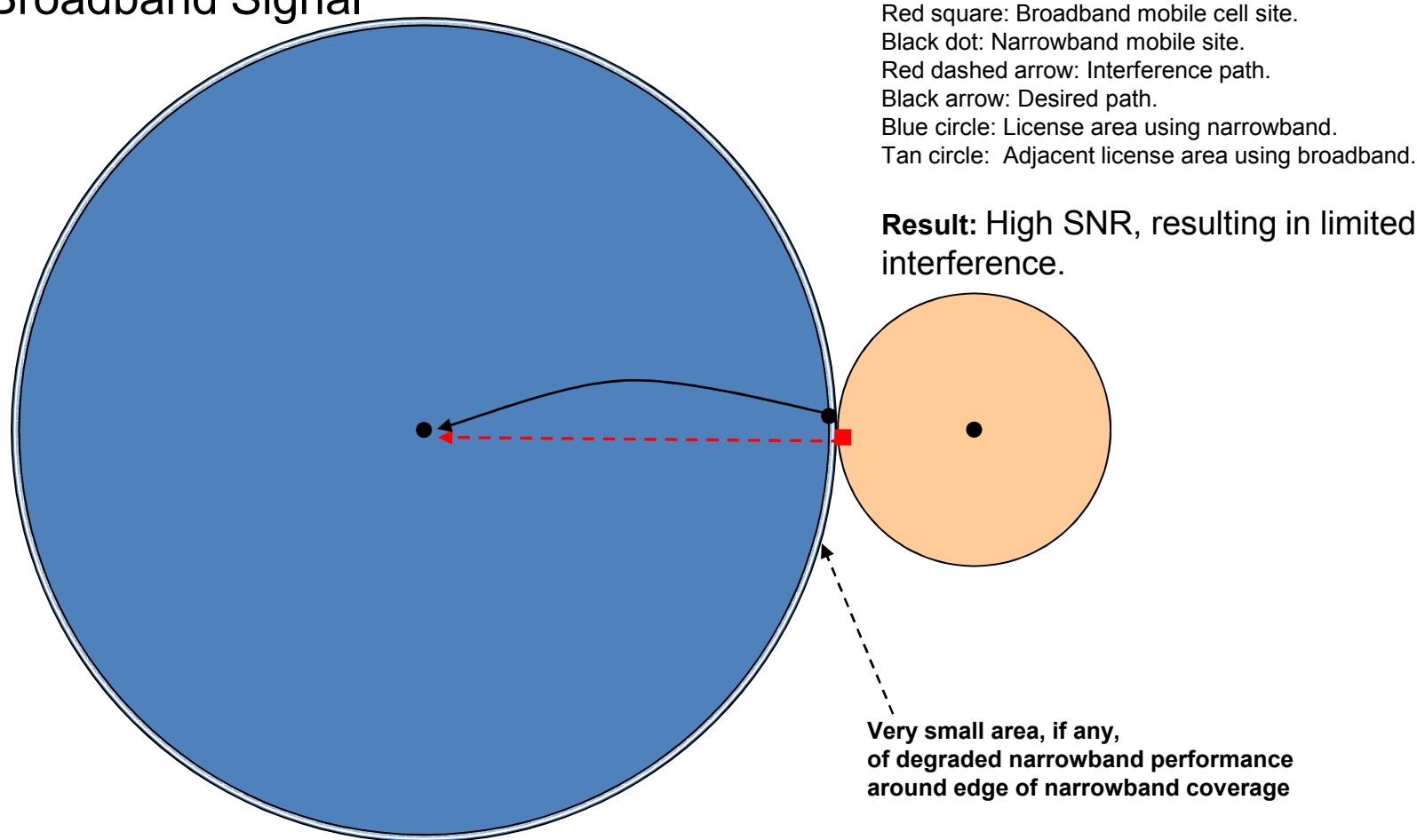
Result: SNR is approximately 10 dB too low, resulting in interference to the narrowband signal. Mitigation requires separating the sites and/or instituting a “buffer” along the border.



Area of degraded narrowband performance from broadband co-channel interference at edge of narrowband coverage

TxP (W)	30	0.2			
Bandwidth Ratio	1	1	All the LMR power is intercepted by the LTE Rx		
Lognormal Shadowing (dB)	6	-6	Chosen to approximate a 95% worst-case		
RxP (W)	120.0	0.1			
C/I (dB)	-33.8		Need to see about -6 dB C/I or better		

Impact on Narrowband Signal From Inbound Broadband Signal



BB	Explanation		
0.2			
360/6.25	360=BW of two LTE RBs; 6.25=BW of NB receiver		
6	Chosen to approximate a goal of minimum of 95% coverage.		

95% worst-case Lognormal Shadowing:
Assuming 10 dB standard deviation on the lognormal shadowing component,
5% of the locations on the border will have the desired signal attenuated by at least 6 dB with respect to the average signal strength
AND the undesired signal attenuated at least 6 dB less than the average signal strength.